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10/576,375

04/19/2006

Anders Oedegaard

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MARSHALL & MELHORN, LLC
FOUR SEAGATE - EIGHTH FLOOR
TOLEDO, OH 43604

EXAMINER

SCULLY, STEVEN M

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

09/28/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/576,375 | OEDEGAARD ET AL. | |
| | Examiner | Art Unit | |
| | Steven Scully | 1795 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 June 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 37-70 is/are pending in the application.
- 4a) Of the above claim(s) 62-70 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 37-61 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>04/19/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1795

**DEVICE AND METHOD FOR INCREASING THE CONCENTRATION OF FUEL IN A
LIQUID FLOW SUPPLIED TO THE ANODE OF A FUEL CELL**

Examiner: Scully S.N.: 10/576,375 Art Unit: 1795 September 23, 2009

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 37-61, in the reply filed on June 8, 2009 is acknowledged. Claims 1-36 were previously canceled and claims 62-70 are withdrawn from consideration. Accordingly, claims 37-61 are pending examination in the application.

Information Disclosure Statement

2. The information disclosure statement filed April 19, 2006 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because US Pat. No. 86,193 and US Pat. No. 127,141 are believed to be irrelevant. The remainder of the references have been considered. It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

Specification

3. The disclosure is objected to because of the following informalities: At paragraph [0007], the specification refers to U.S. Pat. No 0,127,141 A1. It is believed that the applicant intended to refer to U.S. Pre-Grant Publication 2002/0127141 A1. Much the same, in paragraph [0012], the specification refers to U.S. Pat. No. 0,086,193 A1. Again, it is believed that the applicant intended to refer to U.S. Pre-Grant Publication 2002/0086193 A1.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 37-61 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In particular, the specification does not provide support for the throughflow device containing at least one membrane which is permeable or semi-permeable for the fuel but not for the carrier component or comprising such a membrane so that, because of the transport properties of the membrane, fuel can be added passively to the liquid mixture of the fuel and carrier component. Instead, the specification provides support

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for the reverse. Nafion is a commonly used membrane for the polymer electrolyte membrane of a direct methanol fuel cell. For example, Shurtleff (US2003/0228252) discloses a water-selective membrane which allows substantially only water molecules to pass through the membrane. This membrane is made of Nafion, specifically a perfluorosulfonic acid/polytetrafluoroethylene copolymer in the acid (H^+) form. See [0037-0039]. Therefore, it is the position of the examiner the applicant has not provided enablement for a membrane which is permeable or semi-permeable for the fuel but not for the carrier component or comprising such a membrane so that, because of the transport properties of the membrane, fuel can be added passively to the liquid mixture of the fuel and carrier component because the membrane disclosed by the applicant is substantially impermeable to methanol while being permeable to water.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 37-39, 41-46, 54, 56-58, 60 and 61 are rejected under 35 U.S.C. 102(e) as being anticipated by Zimmermann (US2004/0058222A1).

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With respect to claim 37, Zimmermann discloses a passive control of fuel concentration in a liquid feed fuel cell. The device comprises a membrane (16) which swells upon contact with the methanol (22) and contact between the membrane (16) and the fuel mixture (24) in reservoir (14) causes methanol to migrate from the membrane (16) to the fuel reservoir (14). Preferably the membrane (16) is impermeable to water to thereby prevent the back migration of water from fuel reservoir (14) to methanol reservoir (12). See [0028].

With respect to claims 38 and 39, Zimmermann discloses the system to be used with a direct methanol fuel cell. See [0005].

With respect to claim 41, Zimmermann discloses temperature differentials between the two reservoirs can adjust the equilibrium concentrations. See [0021]. Thus, a heating device would be necessary.

With respect to claims 42 and 43, Zimmermann discloses that the device comprises reservoirs (12, 14). These are interpreted as heat insulators comprising insulating material.

With respect to claim 44, Zimmermann discloses passive control of fuel concentration in a liquid feed fuel cell. Meaning, at all times methanol is being added and removed to the mixture to maintain a concentration equilibrium.

With respect to claim 45, Zimmermann discloses the system comprising a tank or container (12, 14).

With respect to claim 46, Zimmermann discloses the device contains fuel in pure or in concentrated form. See [0008].

With respect to claim 54, Zimmermann discloses the device comprises a channel. See Figure 1.

With respect to claim 56, Zimmermann discloses the device comprises a filter, for example at membranes (36,38,40 and 16). See Figures 1 and 2.

With respect to claim 57, Zimmermann discloses the fuel and/or carrier component is a liquid. See [0014].

With respect to claims 58, 60 and 61, Zimmermann discloses the carrier component is water and the fuel is methanol. See abstract.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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10. Claims 47, 48, 51, 52 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann (US2004/0058222) as applied to claims 37-39, 41-46, 54, 56-58, 60 and 61 above.

With respect to claim 47, Zimmermann does not disclose the particular fuel concentration claimed. However, Zimmermann recognizes concentration range to be a relevant factor in developing a system for controlling the concentration of methanol in the system. See [0006]. It would have been obvious to one of ordinary skill in the art to vary the concentration of the fuel based on its intended use. Further, it is the position of the examiner that the fuel concentration is not critical.

With respect to claims 48 and 52, Zimmermann does not explicitly disclose a support or stabilizing device. However, obviously it is beneficial to provide a supportive structure to a system to prevent physical damage.

With respect to claim 51, Zimmermann does not disclose the throughflow rate. However, Zimmermann recognizes size is a relevant factor in developing a system for controlling the concentration of methanol in the system. See [0006]. Depending on the size of the membrane, the throughflow rate in ml/min would vary. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to adjust the size of the liquid feed depending on the intended use (i.e. intended flow rate to a fuel cell).

With respect to claim 55, Zimmermann does not disclose the cross-section of the channel. However, it is commonly known to make a pipe-like device circular in cross-

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section. Further, it is the position of the examiner that the shape of the membrane is not critical.

11. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann (US2004/0058222) as applied to claims 37-39, 41-46, 54, 56-58, 60 and 61 above, and further in view of Neutzler et al. (US2002/0076599)

With respect to claim 40, Zimmermann discloses a direct methanol fuel cell which creates water. Neutzler et al. disclose a direct methanol fuel cell including a water management system. To aid in supplying methanol and water to the anode, it would be beneficial to recirculate the aqueous fuel mixture after the fuel cell reaction, and recycle the water generated at the cathode in the fuel cell reaction, as well as the water arriving at the cathode via diffusion and electro-osmotic drag. See [0005]. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to include a recycling feed of the water from the cathode to the inlet fuel in order to aid in supplying methanol and water to the anode.

12. Claims 49 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann (US2004/0058222) as applied to claims 37-39, 41-46, 54, 56-58, 60 and 61 above, and further in view of Beisswenger et al. (US2004/0003720)

With respect to claims 49 and 53, Zimmermann does not disclose a support structure comprising a foamed material. Beisswenger et al. disclose a system for hydrogen separation. The separation device is a membrane. See [0009]. Beisswenger

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et al. further disclose a support structure (8) on the membrane made of a foamed material. This foam is used to provide support for the membrane. See [0057]. It would have been obvious to one of ordinary skill in the art at the time of the invention to include a foamed support on the separation membrane of Zimmermann because it provides support for the membrane.

13. Claims 50 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann (US2004/0058222) as applied to claims 37-39, 41-46, 54, 56-58, 60 and 61 above, and further in view of Shurtleff (US2003/0228252).

With respect to claim 50, Zimmermann does not disclose the membrane is a perfluorosulfonic acid/polytetrafluoroethylene copolymer in acidic form. Shurtleff discloses Nafion (PFSA/PTFE) is a water-selective membrane which can be used to remove the water from a system. See [0037-0039]. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the membrane of Shurtleff because it provides a selective membrane for separation.

With respect to claim 59, Nafion inherently releases sulfonic acid and therefore the methanol/water mixture would inherently comprise an acid.

Contact/Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Scully whose telephone number is (571)270-5267. The examiner can normally be reached on Monday to Friday 7:30am to 5pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571)272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. S./

Examiner, Art Unit 1795

/Dah-Wei D. Yuan/

Supervisory Patent Examiner, Art Unit 1795